

### REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Final Office Action dated March 4, 2009 has been received and its contents carefully reviewed. Claims 1-9 and 11 are currently pending. Reexamination and reconsideration of the pending claims are respectfully requested.

The Office Action rejects claims 1-2, 5-7, and 11 under 35 U.S.C. §103(a) as being obvious over “Nanofabrication of Organic/Inorganic Hybrids of TiO<sub>2</sub> with Substituted Phthalocaynine or Polythiophene” to Ding (*Ding*) in view of “Polymer brushes: surface-immobilized macromolecules” to Zhao (*Zhao*). Applicants respectfully traverse the rejection.

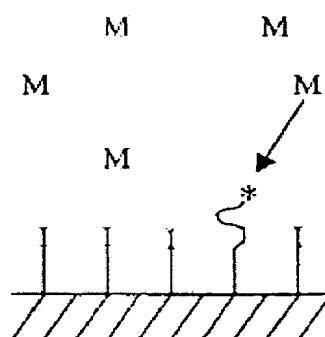
In order to establish *prima facie* obviousness of the claimed invention, all the elements must be taught or suggested by the prior art. The combined teachings of *Ding* and *Zhao* fail to teach each and every element of claims 1-2, 5-7 and 11, and thus, cannot render these claims obvious.

Claim 1 recites, “a step in which a substrate made of a porous oxide ceramic is functionalized by chemical grafting of one or more compounds containing at least one group that can be polymerized with one or more precursors ... a step in which said precursor or precursors are polymerized.” The present application further explains that “the materials of the invention have improved interpenetration of the polymers into the ceramic. This is due to the fact that the materials of the inventions are by a method involving a step of impregnating a porous oxide ceramic substrate with polymer precursors and not with polymers themselves, thereby improving the interpenetration into the porous ceramic of the infiltrating species because the precursors are smaller in size than the polymers used in the prior art.” *Specification*, page 9, line 25, to page 10, line 3.

*Ding* fails to teach or suggest the above-recited elements of claim 1. In fact, the Office Action admits that “Ding is silent to a step in which the substrate thus functionalized being impregnated with a solution containing the precursor(s); and a step in which the precursor(s) are polymerized.” *Office Action*, page 3. *Zhao* does not cure the deficiency of *Ding*. The Office Action states that “Zhao teaches a conventional chemical grafting method (grafting from) that requires the step of functionalizing the surface (I, initiators) and impregnating with a solution of precursors (M, monomers) which are then polymerized (Figure

9).” Office Action, page 3. Applicants respectfully disagree with the Office Action’s interpretation of *Zhao*.

The “grafting from” method described in section 4, page 693 and figure 9 of *Zhao* is different from the method of claim 1. In fact, *Zhao* discloses that “‘Grafting from’ can be accomplished by treating a substrate with plasma or glow-discharge to generate immobilized initiators followed polymerization.” *Zhao*, page 693. In other words, “grafting from” method includes two steps: generating initiators and polymerization. “Grafting form” method does not include a step of impregnating the surface with monomers. Specifically, “Grafting from” portion of Figure 9 (reproduced below) clearly shows polymerization, wherein monomers (M) are polymerized upon contacting the initiators (M). Figure 9 also shows that Monomers (M) do not impregnate or interpenetrate the substrate.



“Grafting from”

Furthermore, *Ding* presents two methods of preparation for ordered ultrathin films of substituted Pc- or PTh-sensitized TiO<sub>2</sub> nanoparticles. *Zhao* discloses a method of increasing grafting density. *Zhao* does not deal with the field of pn-semiconductor or the problem of interpenetration of the n-semiconductor or p-semiconductor region. “[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR International Co. v. Teleflex Inc.*, 550 U.S. \_\_\_, 82 USPQ2d 1385, 1396 (2007). Here, the Office Action fails to articulate a reason as why one of ordinary skill in the art would combine *Ding* and *Zhao*.

Accordingly, claim 1 is allowable over the combined teachings of *Ding* and *Zhao*. Claims 2, 5-7, and 11 variously depend from claim 1, and are also allowable for at least the same reasons as claim 1. Applicants, therefore, respectfully request withdrawal of the rejection of claims 1-2, 5-7, and 11.

The Office Action rejects claims 1-3, 5-9, and 11 under 35 U.S.C. §103(a) as being over “Polythiophene-sensitized TiO<sub>2</sub> Solar cells” to Yagangida (*Yagangida*). Applicants respectfully traverse the rejection.

*Yagangida* does not have a publication date, and was accepted for publication on April 4, 2004. Therefore, *Yagangida* has a publication date no earlier than April 4, 2004. The present application is a national stage application of PCT/FR2004/050591, filed on November 16, 2004, and claims priority to French Patent Application No. 03-50841, filed on November 17, 2003. The effective priority date of the present application is November 17, 2003, which is before April 4, 2004. Applicants file a certified copy of English translation of French Patent Application No. 03-50841 with this paper to perfect claim for priority. Accordingly, *Yagangida* is not prior art under 35 U.S.C. §102(a) against the present application. Applicants, therefore, respectfully request withdrawal of the rejection of claims 1-3, 5-9, and 11.

The Office Action rejects claims 3-4 and 11 under 35 U.S.C. §103(a) as being over *Ding* and *Zhao* and further in view of *Yagangida*. Applicants respectfully traverse the rejection.

As discussed above, *Yagangida* is not prior art under 35 U.S.C. §102(a) against the present application. Therefore, the Office Action fails to establish *prima facie* obviousness of claims 3-4 and 11. Applicants respectfully request withdrawal of the rejection of claims 3-4 and 11.

The Office Action rejects claims 3-4 and 11 under 35 U.S.C. §103(a) as being over *Ding* and *Zhao* and further in view of “A low cost, high efficiency solar cell based on dye sensitized colloidal TiO<sub>2</sub> films” to O’reagan (*O’reagan*). Applicants respectfully traverse the rejection.

Claims 3, 4, and 11 variously depend from claim 1 and incorporate all the elements of claim 1. As discussed, the combined teaching of *Ding* and *Zhao* fails to teach or suggest at least the above-recited elements of claim 1, namely, “a step in which a substrate made of a porous oxide ceramic is functionalized by chemical grafting of one or more compounds containing at least one group that can be polymerized with one or more precursors ... a step in which said

precursor or precursors are polymerized.” *O’regan* does cure the deficiency of *Ding* and *Zhao*. In fact, the Office Action only cites *O’regan* for disclosing that the nanoparticles are mesoporous. Office Action, page 9. Accordingly, claim 1 and its dependent claims 3, 4, and 11 are allowable over the combined teaching of *Ding*, *Zhao*, and *O’regan*. Applicants, therefore, respectfully request withdrawal of the rejection of claims 3, 4, and 11.

The application is in condition for allowance and early, favorable action is respectfully solicited. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Dated: September 4, 2009

Respectfully submitted,

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